RESEARCH PLAN PROPOSAL

An Enhanced SaaS Service Framework for Porting E-Commerce Applications to Cloud Environment

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Topic:

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Introduction

The traditional process of development and deployment of an enterprise application requires installation and setup at every new customer site by the IT staff. Enterprise also requires maintenance staff to keep the system running up. These all activities increases the real cost of the production.

In an attempt to gain a competitive edge, enterprises are continuously trying to reduce their computing, administrative and infrastructure cost. This has forced the realization of new innovative technologies. Cloud computing is one of the technologies that have received major attention.

Due to the advantages of cloud technology, small and large scale enterprises migration their applications software, databases and infrastructure to the cloud environment. Despite of all the advantages and performances, the potential adopters of cloud are still in a confusion whether porting services to cloud or not, because cloud computing is still in an immature state because the cloud migration could result in exposure of confidential internal data of the organization. Therefore before migrating to the cloud we need to analyze and plan carefully, to ensure the compatibility issue as well as the integrity of the organizational data. So in this research proposal we want to propose a Data and Application porting Framework over cloud architecture.

Cloud Computing

Marks et al. (2010) defined Cloud computing as a type of computing that provides simple, on-demand access to pools of highly elastic computing resources. These resources are provided as a service over a network (Internet). Cloud enables the customers of the technology to think of computing, effectively limitless, at minimal cost, and with high reliability, as well as not being concerned about how it is constructed, how it works, who operates it, or where it is located.

According to the US National Institute of Standards and Technology (NIST)

“Cloud Computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

In other words, cloud is a network of servers that pools different resources and cloud computing is a computing where the customers can access those servers using a web browser

regardless of their device and location. A cloud provides on demand access to the resources and automatically deprivations them when there is no demand.

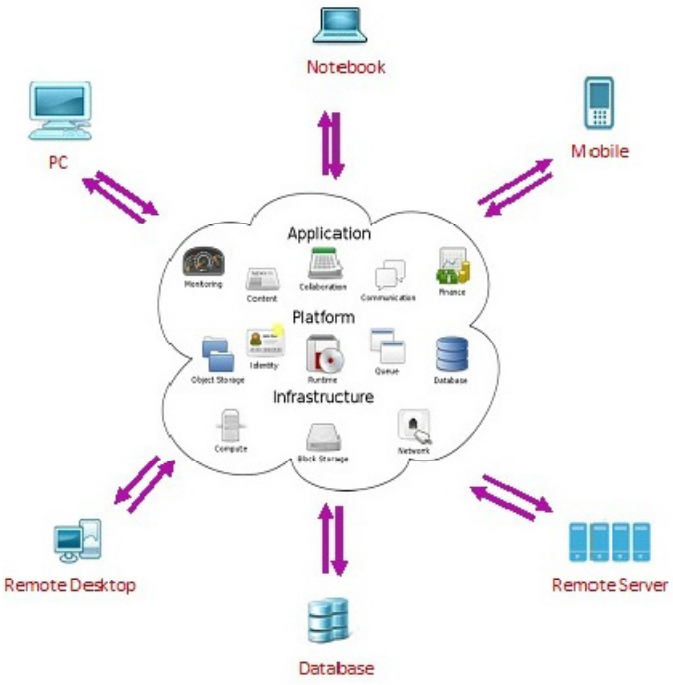


Figure 1: Cloud Model Architecture

Table 1: Key Characteristics of Cloud Computing

Characteristic	Description	References
On-demand service	Services or computing capacity made available as needed.	Mell and Grance(2011)
Ubiquitous access	Services can be accessible over the internet	Armbrust et al. (2009), Mell and Grance(2011)
High elasticity and scalability	Computing capabilities can be elastically provisioned, and dynamically scaled up or down with demand.	Mell and Grance (2011), Qian et al. (2009)
Pay-per-use	Users are charged for actual use of service instead of by subscription	Armbrust et al. (2009), Staten (2008)
Location independence	Users can access data and services without knowing its physical location.	Iyer and Henderson (2010)
No upfront commitment	Organizations can start small and increase resources as needed	Armbrust et al. (2009)

The NIST describes three cloud computing service models:

- Infrastructure as a Service (IaaS): it offers storage and computing resources as a service
- Platform as a Service (PaaS): it offers development and deployment environment for customers applications
- Software as a Service (SaaS): it offers purpose-built business applications.

Iyer et al. (2010) divided cloud computing vendors based on different levels of abstraction. Cloud computing is an emerging area in the IT industry. Number of companies can be seen as major cloud service provide. Table 2 lists some of the major cloud service providers with divided into the three NIST service models

Table 2: Existing Cloud Service Models

Service	Vendors	Description
IaaS	Amazon	Elastic Compute Cloud (EC2) virtualized cloud infrastructure; Simple Storage Service (S3) cloud storage
	VMware	Vblocks: helps business customers build out clouds based on Vblock packages.
	Rackspace	Rackspace Cloud: Cloud Sites, Cloud Servers, Cloud Files.
	Joyent	Joyent Accelerators (virtual servers)
	3Tera	AppLogic: provides infrastructure solution
PaaS	Google	A platform for developing and hosting web applications in Googlemanageddata centers; supports Python and Java.
	VMware	vCloud: manages applications within private clouds or has them federated on-demand to partner-hosted public clouds.
	Salesforce.com	Force.com Platform (Custom Cloud 2, Development Platform)
	Microsoft	Azure: a Windows-as-a-service platform consisting of the operating system and developer services
	Joyent	OpenSolaris
	IBM	Blue Cloud computing platform: enhances software development and delivery capabilities, particularly in large companies
	NetSuite	SuitCloud: offers on-demand products, development tools, and Services
	3Tera	Cloudware: offers applications and storage.
SaaS	Google	SaaS: Web-based communication, collaboration, & security applications including Gmail, Google Calendar, Google Talk, and Google Docs
	Salesforce.com	CRM (Sales Cloud 2, Service Cloud 2)
	NetSuite	SuitCloud: offers on-demand products, development tools, and

		Services
Iaas—Infrastructure as a Service; Paas—Platform as a Service; SaaS—Software as a Service.		

Table 3: The deployment models of Cloud Computing

Type	Description	Reference
Public Cloud	The cloud service policy, value and costing are defined by a service provide and used by general public.	The NIST Definition of Cloud Computing (Mell and Grance 2011)
Community Cloud	The cloud infrastructure is shared by several organizations belonging to a single group or community. The infrastructure is hosted by third party of by the community.	
Private Cloud	The cloud model for a single organization and is maintained by organization or third parties	
Hybrid Cloud	The cloud infrastructure is a combination of two or more cloud models (private, community or public)	

Cloud Computing Challenges

- Security and Privacy
- Lack of Standards
- Continuously Evolving
- Compliance Concerns

Benefits of Cloud Computing for E-commerce

The cloud computing and e-commerce highly benefit from the Internet. Cloud computing allows consumers and clients to use services, computational resources and storage in a transparent way. E-commerce on the other hand, allows consumers to buy services or products from just about anywhere in the globe and anytime. The cloud computing for e-commerce has several benefits. The cost can be calculated based on the need of each company. According to Amazon, cloud computing helps businesses to significantly reduce the costs on several places such as hardware procurement, security, privacy, energy, and maintenance.

Basic Definition of Portability

Portability is about the ability to move an entity from one system to another so that it is usable on the target system .The main problem caused by the lack of portability is that it may take considerable effort to transform the entity from its format on the source system to the format required by the target system. Portability is divided into two separate areas: data portability and application portability:

Data portability: is the ability to easily transfer data from one cloud service to another

cloud service, without being required to re-enter the data. It is the ease of moving the data that is the essence here. This might be achieved by the source service supplying the data in exactly the format that is accepted by the target service. But even if the formats do not match, the trans -formation between them may be simple and straightforward to achieve with commonly available tools.
The first aspect of data portability is that there must be a capability to retrieve customer data from the source cloud service and also a capability to import customer data into the target cloud service.The second aspect of data portability is the syntax and semantics of the transferred data. The syntax of the data should ideally be the same for the source service and the target service.

Application portability: is the ability to easily transfer an application or application components from one cloud service to a comparable cloud service and run the application in the target cloud service. The ease of moving the application or application components is the key here. The application may require recompiling or re-linking for the target cloud service, but it should not be necessary to make significant changes to the application code.

Portability Scenarios
This section leverages a set of scenarios to describe portability considerations and requirements including recommendations on how to address them.
1. Customer switches between providers for a cloud service
2. Customer uses cloud services from multiple providers
3. Customer links one cloud service to another cloud service
4. Customer links in-house capabilities with cloud services
5. Migration of customer capabilities into cloud services

Customer Links One Cloud Services to another Cloud Services
Our scope is in this scenario, in which the customer uses two cloud services, but one of the cloud services is used directly by the other one. The ability to link cloud services together in support of a single application or an integrated set of applications is emerging as a useful approach where different cloud services can each provide specific capabilities which can be even more effective when linked together. Business technology leaders are quickly coming to a point of understanding that a single cloud solution provider may be challenged to meet the needs of their entire organization.

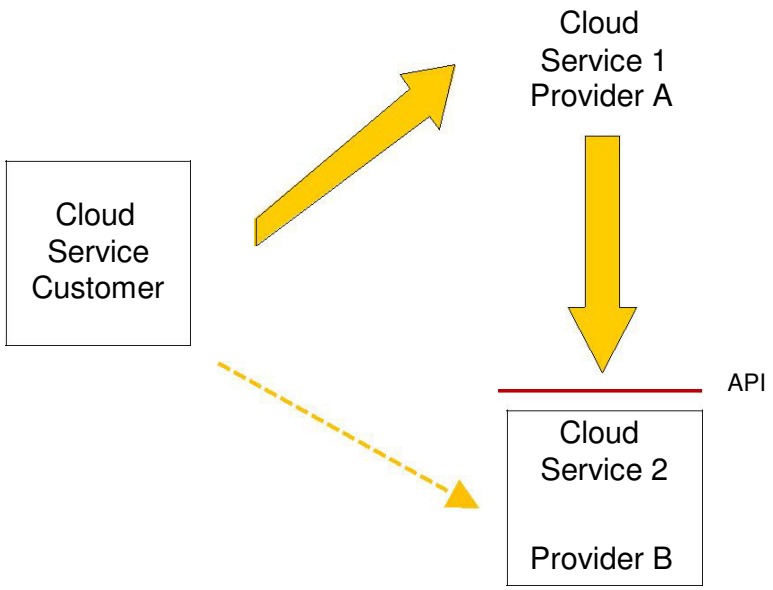


Figure 2: Customer Links One Cloud Service to another Cloud Service [14]

For SaaS services, data portability can be a significant issue where cloud service 1 is equivalent to cloud service 2 (as in the case of scenario 1). Even in cases where the two SaaS services are not equivalent in functionality, there may be a need to use some data extracted from cloud service 1 in the operation of cloud service 2 – in this case, it is best if the data extract has the same format, extent and semantics for cloud service 1 and cloud service 2. If not, then some form of data transformation may be required in order for the customer to use both cloud services successfully.

Table 4: Portability Model

#	Layer	Aim	Objects	Solution
1	Technical	Technically secure data transfer	Signals	Protocols of data transfer
2	Syntactic	Processing of received data	Data	Standardized data exchange formats, e.g. XML
3	Semantic	Processing and interpretation of received data	Information	Common directories, data keys, ontologies
4	Organizational	Automatic linkage of processes among different systems	Processes (workflow)	Architectural models, standardized process elements

Cloud Portability Challenges

When we decide to move an application between clouds, there are challenges. These include:

1. Rebuilding the application and application stack in the target cloud.
2. Setting up the network in the target cloud to give the application the support that it had in its original cloud.
3. Setting up security to match the capabilities provided by the source cloud.
4. Managing the application running in the target cloud.
5. Handling data movement and the encryption of data while it is in transit and when it gets to the target cloud

Standards for Portability

To date, most of the focus for cloud interoperability and portability standards has been at the IaaS layer although activity at the PaaS level is starting to accelerate. In addition, there are several security standards that enable and facilitate cloud computing interoperability even though they are not exclusive to cloud computing. Cloud computing customers should determine the level of support for the following standards by prospective cloud service providers. Lack of support for these standards is likely to result in interoperability and portability challenges down the road.

• **Open Virtualization Format (OVF)**. A packaging standard developed by the Distributed Management Task Force (DMTF) that is designed to address the portability and deployment of virtual machines.

• **Cloud Data Management Interface (CDMI)**. A standard defined by the Storage Networking Industry Association (SNIA) that defines the functional interface that applications will use to create, retrieve, update and delete data elements from the cloud.

• **Open Cloud Computing Interface (OCCI).** A set of open specifications delivered through the Open Grid Forum that defines a protocol and API for all kinds of cloud computing management tasks.

• **Topology and Orchestration Specification for Cloud Applications (TOSCA).** A standard developed by OASIS that enables the interoperable description of application and infrastructure cloud services, the relationships between parts of the service, and the operational behavior of these services (e.g., deploy, patch, shutdown).

• **Cloud Application Management for Platforms (CAMP).** A standard developed by OASIS that defines an interoperable protocol that cloud implementers can use to package and deploy their applications.

• **Cloud Auditing Data Federation (CADF).** A standards developed by DMTF that defines open standards for cloud auditing.

• **LDAP, OAuth, OpenID Connect and SAML.** Standards that enable third party ID and Access Management functionality.

• **US FIPS 140-2.** Standard that specifies the security requirements to be satisfied by a cryptographic module utilized within a security system protecting sensitive information [14].

E-commerce

E-commerce came into existence since late 1970s. It was supposed to provide how the business transactions are made electronically through EDI (Electronic Data Interchange). ETF (Exchange-

Traded Fund) cloud computing and e-commerce are both widely used because of their cost effectiveness. E-commerce is essentially a way of exchanging services and product between the consumer and the company through the Internet.

Existing Framework for cloud porting services

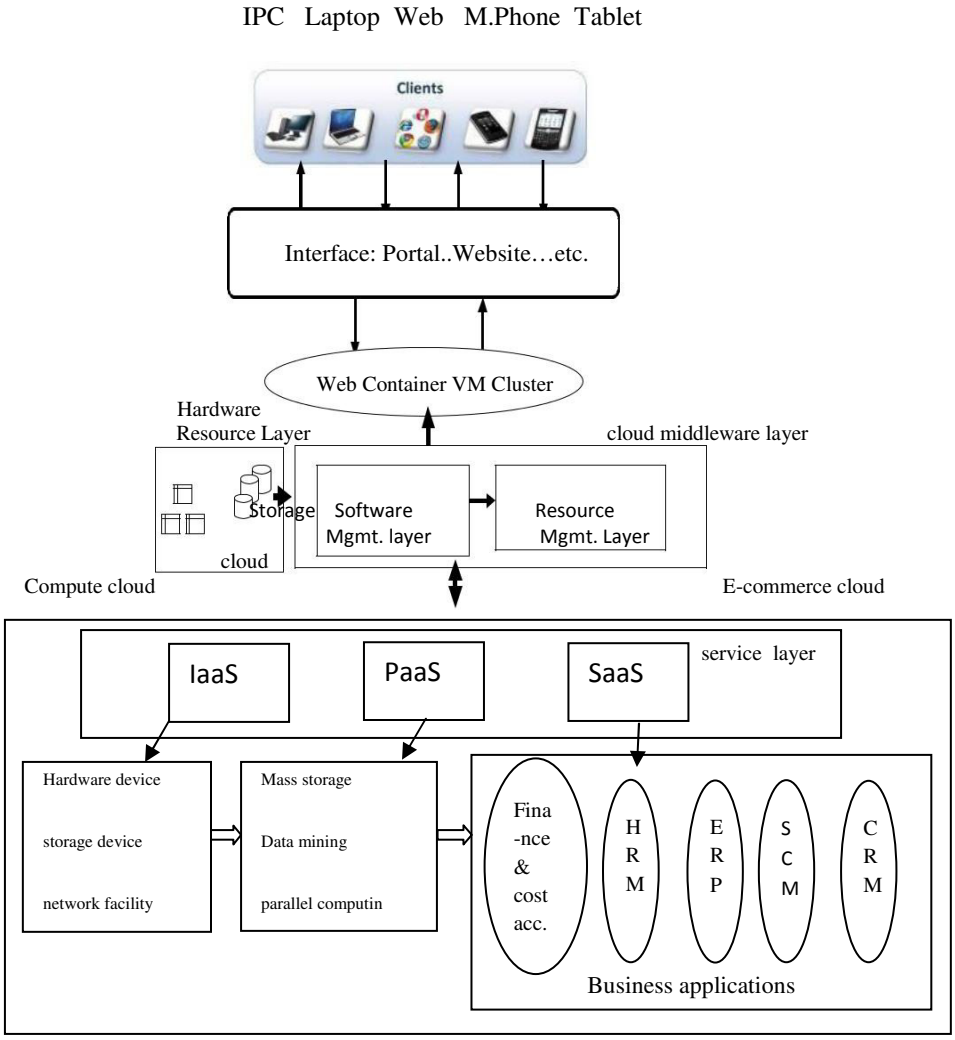


Figure 3: An Existing E-commerce Framework based on Cloud Computing [24]

Limitations of Existing Framework

There are a set of factor which related with the progress of EC development, it needs are changing into its constraints because of the limitation of enterprise size , economic strength, and technical force, which is mainly showed in following aspects:

1. Technical problems such as mass data storage, data mining, Information security etc., become a tough set, especially for small and medium-sized e-commercial businesses.

2. Growing equipment & operation cost are bound to make troubles in the development of e-commerce system.

3. Limitation of information processing capacity and safety performance is imperfect, all of which impede the development of e-commerce [24].

4. In SaaS, the requirement, when switching from one software application to another is to be able to extract the data from the first and load them to the second. For example, if a company uses a CRM application provided from a cloud vendor and decides to switch to a different offering, it is important that all customer data can directly be loaded and processed by the new CRM application [10].

Review of Literature

Using Syntactic and Semantic similarity of web APIs to estimate Porting efforts
Hiranya (2015), They describe an automated methodology for analyzing API similarity and quantifying the porting effort associated with the use of web APIs. They defines a simple type system and a language with which API Developers specify the syntactic and semantic features of APIs. We also define algorithms that transform the syntactic and semantic features of APIs into similarity and porting effort information. They evaluate their approach using both randomly generated and real world API's and show that our metric captures the relative difficulty that developers associated with porting an application from one API to another. They uses command –line tool which is programmed in Python. It takes input using an extended form of Swagger. Swagger is a popular JSON-based language that syntactically describes REST APIs (algorithms) [12].

Response Time Service Level Agreements for Cloud-hosted Web Applications
Hiranya (2015), In this work they present Cerebro – a system for establishing statistical guarantees of application response time in cloud settings. Cerebro combines off-line static analysis of application control structure with on-line cloud performance monitoring and statistical forecasting to predict bounds on the response time of web-facing application programming interfaces (APIs).
They investigate the correctness of Cerebro predictions, the tightness of their bounds, and the duration over which the bounds persist in both Google App Engine and AppScale (public and private cloud platforms respectively).They also detail the effectiveness of our SLA prediction methodology compared to other performance bound estimation methods based on simple

statistical analysis.They first evaluate the correctness of Cerebro predictions. A set of predictions is correct if the fraction of measured response time values that fall below the Cerebro prediction is greater than or equal to the SLA target probability. For example, if the SLA probability is 0:95 (i.e. p=95 in QBETS) for a specific web API, then the Cerebro predictions are correct if at least 95% of the response times measured for the web API are smaller than their corresponding Cerebro predictions [11].

CloudTracker: Using Execution Provenance to Optimize the Cost of Cloud Use
Douglas (2014), They present a framework, called CLOUDTRACKER, that transparently records information from a simulation that is executed in a commercial cloud so that it may be "replayed" exactly to reproduce its results. Using the automated CLOUDTRACKER provenance and replay facilities, scientists can choose either to store the results of a simulation or to reproduce it on-demand – whichever is more cost efficient in terms of the dollar cost charged for storage and computing by the commercial cloud provider. We present a prototype implementation of CLOUDTRACKER for the Amazon AWS commercial cloud and the StochSS stochastic simulation system. Using this prototype, we analyze the storage-versus-compute cost tradeoffs for different classes of StochSS simulations when deployed and executed in AWS [8].

Automatic and Portable Cloud Deployment for Scientific Simulations
Horuk (2014), In this paper, they present CLOUDRUNNER, a framework that extracts arbitrary programs from a source code repository (e.g. GitHub), wraps them in a web service and tasking system, and deploys them over disparate cloud infrastructures and local clusters, automating their portability. In particular, CLOUDRUNNER automatically creates and configures virtual machines so that they can execute the applications, provides a web UI with which users parameterize their applications, deploys instances of the program as background tasks, and collects the results for easy access via a browser. CLOUDRUNNER is an ideal framework for deploying scientific simulation applications portably and as such, we use it to implement StochSS – Stochastic Simulation as-a-service (now available at http://www.stochss.org).
They use StochSS to evaluate CLOUDRUNNER overheads and find that they are small, consistent, and amortized for even short running applications [13].

The AppScale Cloud Platform Enabling Portable, Scalable Web Application Deployment
Krintz (2013), AppScale is an extensible and freely available distributed cloud platform that facilitates simplified development, automated deployment, and empirical investigation of cloud apps and their service ecosystems. AppScale enables applications written in high-level languages to execute via AppScale over different cloud fabrics and to employ a vast diversity of application service implementations without modification. Such portability enables novice and expert developers alike to quickly and easily develop GAE apps that implement interesting Web service and data analytic applications and use extant and emerging cloud systems without requiring them to become experts at the underlying technologies or locked in to any particular cloud or service implementat ion thei r apps use. An AppScale cloud integrates and automatically deploys various open source technologies that facilitate its functionality, including Apache Zookeeper (for fault-tolerant distributed coordination), RabbitMQ (for distributed multitasking), ejabberd/Strophe.js (for messaging and channel communication), Lucene (for full text search), sendmail, memcached (for distributed caching), Hadoop MapReduce, R analytics, the network file system, and the Hadoop distributed file system, among others [16].

A semantic interoperability framework for software as service systems in cloud computing environments

Rezaei (2012),In this paper cloud computing environments in software as a service (SaaS) level, interoperability refers to the ability of SaaS systems on one cloud provider to communicate with SaaS systems on another cloud provider. This paper is accomplished through a number of steps (research methodology). It begins with a study on related works in the literature. Then, problem statement and research objectives are explained. In the next step, semantic interoperability requirements for SaaS systems in cloud computing environments that are needed to support are analyzed. The details of the proposed semantic interoperability framework for SaaS systems in cloud computing environments are presented. It includes the design of the proposed semantic interoperability framework. Finally, the evaluation methods of the semantic interoperability framework are elaborated. In order to evaluate the effectiveness of the proposed semantic interoperability framework for SaaS systems in cloud computing environments, extensive experimentation and statistical analysis have been performed. The experiments and statistical analysis specify that the proposed semantic interoperability framework for cloud SaaS systems is able to establish semantic interoperability between cloud SaaS systems in a more efficient way [23].

Developing and managing customizable Software as a Service using feature model conversion

Moens (2012),The author describes growing interest in cloud technologies. Using current cloud solutions, it is however difficult to create customizable multi-tenant applications, especially if the application must support varying Quality of Service (QoS) guarantees. Software Product Line Engineering (SPLE) and feature modeling techniques are commonly used to address these issues in non-cloud applications, but these techniques cannot be ported directly to a cloud context, as the common approaches are geared towards customization of on-premise deployed applications, and do not support multi-tenancy. In this paper, the author propose an architecture for the development and management of customizable Software as a Service (SaaS) applications, built using SPLE techniques. We specifically focus on how development feature models can be adapted ensuring a one-to-one correspondence between features and services exists, ensuring the composition of services yields an application containing the corresponding features. These runtime features can then be managed using feature placement techniques. The proposed approach enables developers to define significantly less features, while limiting the amount of automatically generated features in the application runtime stage. Conversion times between models are shown to be in the order of milliseconds, while execution times of management algorithms are shown to improve by 5 to 17% depending on the application case [21].

Design and implementation of cloud-based port logistics public service platform

Liu (2015),Based on the actual needs of Smart Humen Port, a logistics cloud platform for Dongguan Port of Humen is constructed. Using cloud computing techniques, the platform implements the resource integration of physical servers, storage devices and a variety of heterogeneous applications, and provides enterprises public infrastructure services, basic business systems and supporting systems, and enterprise portal online customizing and building services. This paper describes the software architecture and design ideas of the platform, and

gives the integrated application cases. Experimental results show that the constructed platform has good availability and load balancing property [18].

Cloud Computing Based E-Commerce as a Service Model: Impacts and Recommendations
Talib (2016),The main goal of this proposed model is to integrate the E-commerce as a service enterprise and cloud computing. Cloud computing provide a number of internal services such as software as a service (SaaS), hardware as a service (HaaS), platform as a service (PaaS), infrastructure as a service (IaaS), data as a service (DaaS) and communication as a service (CaaS) beside an external services such as the internet service provider, IT service provider, software developer, system integration provider and hardware suppliers. The paper concluded that integrations of the internal and external services could sustain E-commerce development in cloud environment [25].

An Integrated Framework for E-Commerce cloud service level agreement
Busalim (2014),This paper proposes a framework because the range and diversity of cloud computing options, challenges arise between the cloud services providers and e-commerce seller, in regards to the exact nature of their agreement. It is therefore important to establish an agreement between cloud providers and e-commerce seller to guarantee that the correct services are delivered by cloud providers as requested by clients.(Alhamad, Dillon et al. 2010) pointed out that "cloud consumers need service-level agreement (SLA) before they decide to shift their infrastructure to cloud data centres to feel satisfied regarding the resources provided and to be able to reach the desired level of productivity" .On the other hand, cloud service providers also need an SLA to illustrate the quality of services they provide In this paper they propose a SLA framework based on Web services level agreement (WSLA) which is introduced by IBM. The framework integrated with nine parameters that verified and validated based on end user perspective. Data were collected from 105 students in University Technology Malaysia. Factor analysis has been used to minimize the redundancy between the parameters and grouped based on the inter correlation between them. The results indicate that all nine parameters are significant and important from end user point view. An e-commerce cloud SLA document designed and run time parameters defined using XML language. Adopting these parameters by ecommerce seller catalyze better protection to the end users during contracting with cloud services providers [4].

Addressing the Challenge of Application Portability in Cloud Platforms
Gonidis (2012), They gave a high level description of the factors that may have an impact on application portability, such as proprietary APIs and differences in the functionality across different platform providers. They have also described the two high level strategies that can be employed to address the challenge of portability: standardization and intermediation. Standardization addresses cross-platform portability through the adoption of common standards by cloud providers. Alternatively, intermediation enables developers to create applications independently of a specific platform and then bind them to particular target platforms through some form of automatic translation [10].

A Proposed Framework based on Cloud Computing for Enhancing E-Commerce Application

Saleh (2012),As a new concept, cloud computing has attracted the IT enterprise attention especially the e-commerce (EC) enterprise. At present, there is a great problem of environmental costs during the enterprises apply the ecommerce, but with the coming of cloud computing, all of the problem will be solved. Therefore, this paper will introduce a proposed e-commerce application framework based on the concepts, the origins and development trend of cloud computing which copes with the problem of e-commerce and the storage of resources. A proposed framework allows enterprises to lower costs through the effective implementation of EC activities, and solves the problem of enterprises which cannot develop e-commerce activities due to lack of resources [24].

How to adapt applications for the Cloud environment: Challenges and solutions in migrating applications to the Cloud

Andrikopoulos (2012),The migration of existing applications to the Cloud requires adapting them to a new computing paradigm. Existing works have focused on migrating the whole application stack by means of virtualization and deployment on the Cloud, delegating the required adaptation effort to the level of resource management. With the prolif-eration of Cloud services allowing for more flexibility and better control over the application migration, the migration of individual application layers, or even individ-ual architectural components to the Cloud, becomes possible. Towards this goal, in this work we focus on the challenges and solutions for each layer when migrating different parts of the application to the Cloud. They categorize different migration types and identify the potential impact and adaptation needs for each of these types on the application layers based on an exhaustive survey of the State of the Art [3].

Multiobjective optimization for brokering of multicloud service composition

Amato(2016), The choice of cloud providers whose offers best fit the requirements of a particular application is a complex issue due to the heterogeneity of the services in terms of resources, costs, technology, and service levels that providers ensure. This article investigates the effectiveness of multiobjective genetic algorithms to resolve a multicloud brokering problem. Experimental results provide clear evidence about how such a solution improves the choice made manually by users returning in real time optimal alternatives. It also investigates how the optimality depends on different genetic algorithms and parameters, problem type, and time constraints [2].

Critical analysis of vendor lock-in and its impact on cloud computing migration: a business perspective

Martins (2016),Vendor lock-in is a major barrier to the adoption of cloud computing, due to the lack of standardization. Current solutions and efforts tackling the vendor lock-in problem are predominantly technology-oriented. Limited studies exist to analyse and highlight the complexity of vendor lock-in problem in the cloud environment. Consequently, most customers are unaware of proprietary standards which inhibit interoperability and portability of applications when taking services from vendors. This paper provides a critical analysis of the vendor lock-in problem, from a business perspective [20].

Performance parameters of cloud services

- Syntactic similarities of web APIs
- Semantic similarities of web APIs
- Comparing API operations pair wise
- Quantifying porting efforts of operation
- Two phase API similarity analysis
- Correctness ,Tightness, Duration of prediction validity
- Average cost on a sub-hour basis.
- Time saving when we increase the size of instance
- Cost effectiveness when adding more compute resources

Services of SaaS for E-Commerce Applications

- Updating the software platform
- CRM management
- Security measures
- Scalability
- Testing & Design to Implement
- Content management
- Payment processing standards
- Financial management
- HRM
- Billing

Testing Tools for cloud porting Services

- We use command-line tool which is programmed in Python. It takes input using an extended form of Swagger. Swagger is a popular JSON-based language that syntactically describes REST APIs (algorithm).
- For analyzing and transforming Java byte code 'SOOT' Framework will use.
- For configuration CFG (control flow graph) will use.
- To make SLA predictions, cerebro uses QBETS for high performance computing and forecasting
- For job manager EC2 services will use.
- StochSS simulation tool will use for probability checking.
- CloudSim Automation is a Java command line tool based on CloudSim and CloudReports classes that is able to read specifications of CloudSim simulation scenarios from a YAML file, a very human readable data format. Simulation scenarios can be written inside a YAML file and Cloud Automation Tool reads these simulation scenarios, creates and runs them on CloudSim.
- The tool releases us of the need to write Java code just to run simulation scenarios. By this way, the attention can be focused on the problem to be solved, such as creation of new algorithms to load balancing, new virtual machine scheduling policies, VM placement, resource provisioning, workload prediction, server consolidation, energy efficiency, cost reduction and so on.

- Tenzing Site Tester is a fully managed cloud-based, multi-endpoint load testing service that simulates peak load on your website across a range of geographies, device types and networks. It also speeds root cause analysis and remediation by pinpointing performance issues in real time.
- The tools OpenSTA, OpenWebLoad and WAPT 4.0 were studied to get a clearer view on the functions and processes of a web server load test tool.
- ZenQ is a global provider of high quality Software Development & Testing Services, offering cost effective value-add outsourcing solutions to our clients. Our highly competent IT Professionals, Domain experts, combined with industry best practices & our investments in state-of-the-art technologies makes us a dependable and long-term IT service partner to all our clients.
- 4.1 Apache JMeter, 4.2 Load Focus, Nouvola

Motivation to the Work

Cloud computing is a new practice mode applied to ecommerce. The integration of cloud computing and ecommerce has not yet reached a mature stage and still needs the test of practice. At present, there are still many problems that need to be solved:

1. Security Issues of Cloud Computing Platforms:
Cloud security includes the data security and the confidentiality of privacy. Currently, all types of cloud computing, i.e., private cloud, public cloud, mixed clouds, and other concepts, have been proposed and gradually applied to practice, but whether they are effective remains to be further verified.

2. Challenges of Cloud Applications:
For some e-commerce companies, entrusting the work to the third party contains some elements of risks. These risks may be greater than the benefits for the business. Therefore, they will be worried to developed their system with connect to a third parity.

3. The Standards of Cloud Computing:
The cloud-based e-service model is still in a fragmented state. If the users really want to promote and apply these new models, a unified industry standard should be developed.

4. Regulatory Issues of Cloud Services
There are many services which can be provided through the cloud computing platforms. Information processing, data storage, security, maintenance and other work are usually deal with by the cloud service providers in cloud computing environment. Then, the service provider's position will become crucial to properly handle the information that is related to the user's information security. Therefore, there is an important issue is how to monitor service [21] .

5. Lock-in Problem in portability
Portability across cloud providers would eliminate the vendor lock-in problem and would allow consumers to switch between vendors according to their needs.

Objectives of Research

- Obtaining the analysis & understanding about porting SaaS services on cloud architecture.
- To study and describe cloud porting: Find out state-of-the-art in cloud porting SaaS services approaches and the categories of the approaches that exist in the field.
- To examine typical problems and needs that industrial practice faces during porting of SaaS services on cloud architecture.
- Design an enhanced framework for e-commerce applications porting services.
- Testing and validation of enhanced framework of SaaS porting services on cloud architecture.

Research Approach

- In phase I objective 1 and 2 will be answered by performing extensive literature survey where relevant theory and frameworks regarding porting Saas services of E-Commerce applications on cloud architecture.
- In phase II Surveys will be performed in different organizations, which are and have been involved in porting SaaS services projects. Changes needed during porting SaaS services on cloud architecture, will be identified by conducting interviews and case studies. Survey participants could be industry and academia personnel's.
- In phase III the analysis of data and its evaluation will be done through some tools-StochSS.
- In phase IV we will design a framework of our services, which is based on some standard language.
- In phase V the results above phases would be investigated. With the help of few statistical tools like SPSS, CloudSim Automation the analysis on the collected data would be done. With the help of analyzed results the evaluation of the theoretical model would be performed.

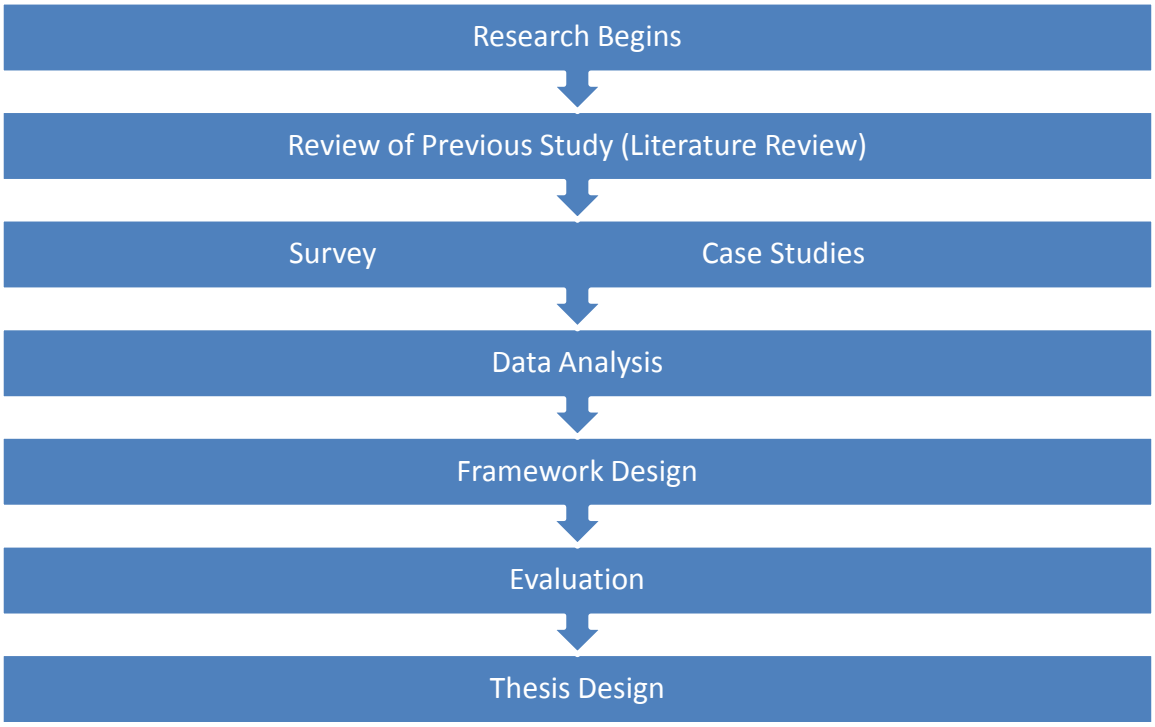
Work Plan

The work plan indicates the projected timing of the next milestone in the research. We have divided our research work into different phases which are as follows:

Table 5:

Phase Number	**Approximate time duration (in months)**	**Phase Description**
1	For the first 5-6 Months	Literature Review and current study
2	For the next 4-6 Months	Case studies and Interview/online Survey

3	For the next 6 Months	Data Analysis/Evaluation
4	For the next 6-8 Months	New Framework Design & Evaluation
5	At least 5-6 Months	Thesis Design



Place of Work and Facilities Available

The research work will be undertaken with the help of online tools and cloud applications. The Case Study and Interviews would be conducted on personal basis or through social network sites.

Limitations & Alternative Plan of the study

Some tools and consultation may be required for the research work. With the help of university resources, workshops and online learning these limitations could be overcome.

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